CLAIMS

1. A wireless access system using Carrier Sense Multiple Access for Media Access Control of a host device by terminals, the wireless access system comprising:

a master station for converting an electrical signal in a downstream direction inputted from the host device into an optical signal and sending out the optical signal to an optical fiber transmission line, and for converting an optical signal in an upstream direction inputted through the optical fiber transmission line into an electrical signal and outputting the electrical signal to the host device;

a plurality of slave stations each for converting an electrical signal in the upstream direction received from any one of the terminals in a wireless communications area into an optical signal and sending out the optical signal to the optical fiber transmission line, and for converting an optical signal in the downstream direction inputted through the optical fiber transmission line into an electrical signal and sending out the electrical signal to the wireless communications area; and

an access control section for transmitting an optical signal in the downstream direction sent out from the master station, to each of the plurality of slave stations through the optical fiber transmission line, transmitting an optical signal in the upstream direction sent out from any one of the plurality of slave stations,

to the master station through the optical fiber transmission line, and notifying all other slave stations that the one of the slave stations has outputted the optical signal in the upstream direction.

2. The wireless access system according to claim 1, wherein the access control section comprises an optical multiplexing/demultiplexing section for allowing an optical signal in the downstream direction sent out from the master station to be demultiplexed and transmitting the demultiplexed optical signals to the plurality of slave stations, and for allowing the optical signal in the upstream direction sent out from the one of the slave stations to be demultiplexed and transmitting the demultiplexed optical signals to the master station and the all other slave stations.

3. The wireless access system according to claim 1, wherein the access control section comprises an optical multiplexing/demultiplexing section for allowing an optical signal in the downstream direction sent out from the master station to be demultiplexed and transmitting the demultiplexed optical signals to the plurality of slave stations, and for allowing the optical signal in the upstream direction sent out from the one of the slave stations to be demultiplexed and transmitting the demultiplexed optical signals to the master station and the

plurality of slave stations.

4. The wireless access system according to claim 1, wherein the access control section comprises an optical multiplexing/demultiplexing section for allowing an optical signal in the downstream direction sent out from the master station to be demultiplexed and transmitting the demultiplexed optical signals to the plurality of slave stations, and for outputting an optical signal in the upstream direction sent out from the one of the slave stations to the master station, and

the master station superimposes the optical signal in the upstream direction sent out from the one of the slave stations onto an optical signal in the downstream direction and returns the superimposed optical signal back to the optical multiplexing/demultiplexing section.

5. The wireless access system according to claim 1, wherein the access control section comprises an optical multiplexing/demultiplexing section for allowing an optical signal in the downstream direction sent out from the master station to be demultiplexed and transmitting the demultiplexed optical signals to the plurality of slave stations, and for outputting an optical signal in the upstream direction sent out from the one of the slave stations to the master station, and

any one of the terminals transmits a Request-to-Send packet

to the host device via the one of the slave stations and the optical multiplexing/demultiplexing section, and the host device transmits a Clear-to-Send packet to the plurality of slave stations via the optical multiplexing/demultiplexing section, the Clear-to-Send packet being a response to the Request-to-Send packet.

6. The wireless access system according to claim 5, wherein the Clear-to-Send packet includes at least information about authorizing the one of the terminals to start transmission and information about allowing all other terminals to stop transmission for a predetermined period of time.

7. The wireless access system according to claim 2, wherein the optical multiplexing/demultiplexing section is an omnidirectional distribution optical multiplexer/demultiplexer including at least an optical port connected to the master station and a plurality of optical ports connected to the plurality of slave stations, respectively, and having formed therein an optical transmission path through which an optical signal inputted to any one of the optical ports is outputted to all other optical ports.

8. The wireless access system according to claim 3, wherein the optical multiplexing/demultiplexing section is a loopback optical coupler including at least an optical port connected to

the master station, a plurality of optical ports connected to the plurality of slave stations, respectively, and two optical ports connected to each other by a loop and having formed therein an optical transmission path through which an optical signal inputted to any one of the optical ports from any one of the slave stations is outputted to the plurality of slave stations through the two optical ports connected to each other by a loop.

9. The wireless access system according to claim 3, wherein the optical multiplexing/demultiplexing section is a reflection optical coupler including at least an optical port connected to the master station, a plurality of optical ports connected to the plurality of slave stations, respectively, and one optical port processed to be light reflective and having formed therein an optical transmission path through which an optical signal inputted to any one of the optical ports from any one of the slave stations is outputted to the plurality of slave stations through the one optical port processed to be light reflective.

10. The wireless access system according to claim 7, wherein the optical multiplexing/demultiplexing section is composed of a combination of a plurality of optical multiplexing/demultiplexing units each including three optical ports and having formed therein an optical transmission path through which an optical signal inputted to any one of the optical

ports is outputted to all other optical ports.

11. The wireless access system according to claim 7, wherein the optical multiplexing/demultiplexing section is formed of a plurality of optical couplers.

12. The wireless access system according to claim 10, wherein the optical multiplexing/demultiplexing unit is formed of a plurality of optical couplers.

13. The wireless access system according to claim 7, wherein the optical multiplexing/demultiplexing section is formed of an optical waveguide.

14. The wireless access system according to claim 10, wherein the optical multiplexing/demultiplexing unit is formed of an optical waveguide.

15. The wireless access system according to claim 3, wherein the one of the slave stations cancels its own optical signal in the upstream direction which has been returned back thereto from the optical multiplexing/demultiplexing section.

16. The wireless access system according to claim 4, wherein the one of the slave stations cancels its own optical signal in

the upstream direction which has been returned back thereto from the optical multiplexing/demultiplexing section.

17. The wireless access system according to claim 1, wherein the master station comprises:

a first high-frequency amplification section for amplifying the electrical signal in the downstream direction inputted from the host device;

an optical reception section for converting the optical signal in the upstream direction received from the access control section into an electrical signal;

an optical transmission section for converting the electrical signal amplified by the first high-frequency amplification section into an optical signal; and

a second high-frequency amplification section for amplifying the electrical signal converted by the optical reception section.

18. The wireless access system according to claim 4, wherein the master station comprises:

a first high-frequency amplification section for amplifying the electrical signal in the downstream direction inputted from the host device;

an optical reception section for converting the optical signal in the upstream direction received from the access control

section into an electrical signal;

a multiplexing section for allowing the electrical signal converted by the optical reception section and the electrical signal amplified by the first high-frequency amplification section to be multiplexed together;

an optical transmission section for converting the electrical signals multiplexed by the multiplexing section into an optical signal; and

a second high-frequency amplification section for amplifying the electrical signal converted by the optical reception section.

19. The wireless access system according to claim 17, wherein

the master station further comprises:

a transmitted/received signal multiplexing/separation section for allowing the electrical signal in the downstream direction inputted to the first high-frequency amplification section and an electrical signal in the upstream direction outputted from the second high-frequency amplification section to be multiplexed together onto one transmission line.

20. The wireless access system according to claim 17, wherein

the master station further comprises:

an optical signal multiplexing/separation section for allowing the optical signal in the downstream direction transmitted from the optical transmission section and the optical signal in the upstream direction received by the optical reception section to be multiplexed together onto one optical fiber transmission line.

21. The wireless access system according to claim 1, wherein the slave stations each comprise:

an optical reception section for converting the optical signal in the downstream direction received from the access control section into an electrical signal;

a first high-frequency amplification section for amplifying an electrical signal in the upstream direction received from any one of the terminals;

a second high-frequency amplification section for amplifying the electrical signal converted by the optical reception section; and

an optical transmission section for converting the electrical signal amplified by the first high-frequency amplification section into an optical signal.

22. The wireless access system according to claim 15, wherein

the slave stations each comprise:

an optical reception section for converting the optical signal in the downstream direction received from the access control section into an electrical signal;

a first high-frequency amplification section for amplifying an electrical signal in the upstream direction received from any one of the terminals;

a phase inversion section for inverting a phase of the electrical signal amplified by the first high-frequency amplification section;

a delay section for imparting a predetermined amount of delay to the electrical signal whose phase has been inverted by the phase inversion section;

a multiplexing section for allowing the electrical signal converted by the optical reception section and the electrical signal delayed by the delay section to be multiplexed together;

a second high-frequency amplification section for amplifying the electrical signals multiplexed by the multiplexing section; and

an optical transmission section for converting the electrical signal amplified by the first high-frequency amplification section into an optical signal.

23. The wireless access system according to claim 16, wherein

the slave stations each comprise:

an optical reception section for converting the optical signal in the downstream direction received from the access control section into an electrical signal;

a first high-frequency amplification section for amplifying an electrical signal in the upstream direction received from any one of the terminals;

a phase inversion section for inverting a phase of the electrical signal amplified by the first high-frequency amplification section;

a delay section for imparting a predetermined amount of delay to the electrical signal whose phase has been inverted by the phase inversion section;

a multiplexing section for allowing the electrical signal converted by the optical reception section and the electrical signal delayed by the delay section to be multiplexed together;

a second high-frequency amplification section for amplifying the electrical signals multiplexed by the multiplexing section; and

an optical transmission section for converting the electrical signal amplified by the first high-frequency amplification section into an optical signal.

24. The wireless access system according to claim 21, wherein the slave stations each further comprise an optical signal multiplexing/separation section for allowing an optical signal

in the upstream direction transmitted from the optical transmission section and the optical signal in the downstream direction received by the optical reception section to be multiplexed together onto one optical fiber transmission line.

25. The wireless access system according to claim 21, wherein the slave stations each further comprise a transmitted/received signal multiplexing/separation section for allowing the electrical signal in the upstream direction inputted to the first high-frequency amplification section and an electrical signal in the downstream direction outputted from the second high-frequency amplification section to be multiplexed together onto a wireless transmission line by means of one antenna.

26. The wireless access system according to claim 20, wherein the optical signal multiplexing/separation section performs wavelength division multiplexing.

27. The wireless access system according to claim 24, wherein the optical signal multiplexing/separation section performs wavelength division multiplexing.

28. A wireless access method performed by a system using Carrier Sense Multiple Access for Media Access Control of a host device by terminals, the method comprising:

connecting the host device and the terminals via a master station and a plurality of slave stations;

transmitting a signal in a downstream direction outputted from the host device, to the plurality of slave stations from the master station through a predetermined transmission line; and

transmitting a signal in an upstream direction received by a specific slave station from any one of the terminals in a wireless communications area, to the master station and other slave stations through the predetermined transmission line.